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Anomalous diffusion of volcanic earthquakes

Abe S., Suzuki N.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© CopyrightEPLA, 2015. Volcanic seismicity at Mt. Etna is studied. It is found that the associated stochastic process exhibits a subdiffusive phenomenon. The jump probability distribution well obeys an exponential law, whereas the waiting-time distribution follows a power law in a wide range. Although these results would seem to suggest that the phenomenon could be described by a temporally fractional kinetic theory based on the viewpoint of continuous-time random walks, the exponent of the power-law waiting-time distribution actually lies outside of the range allowed in the theory. In addition, there exists the aging phenomenon in the event-time averaged mean squared displacement, in contrast to the picture of the fractional Brownian motion. Comments are also made on possible relevances of random walks on fractals as well as nonlinear kinetics. Thus, problems of volcanic seismicity are highly challenging for science of complex systems.

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